The Cévennes-Vivarais Mediterranean Hydrometeorological Observatory: preliminary assessment of IMERG rain products ~~other studies/observations relevant to GPM~~

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Outline

- OHMCV's radar-raingauge rainfall re-analyses

  (Delrieu et al. *AWR* 2014; Boudevillain et al. *JHydrol*. 2016)

- IMERG4 preliminary assessment (2014-2015)

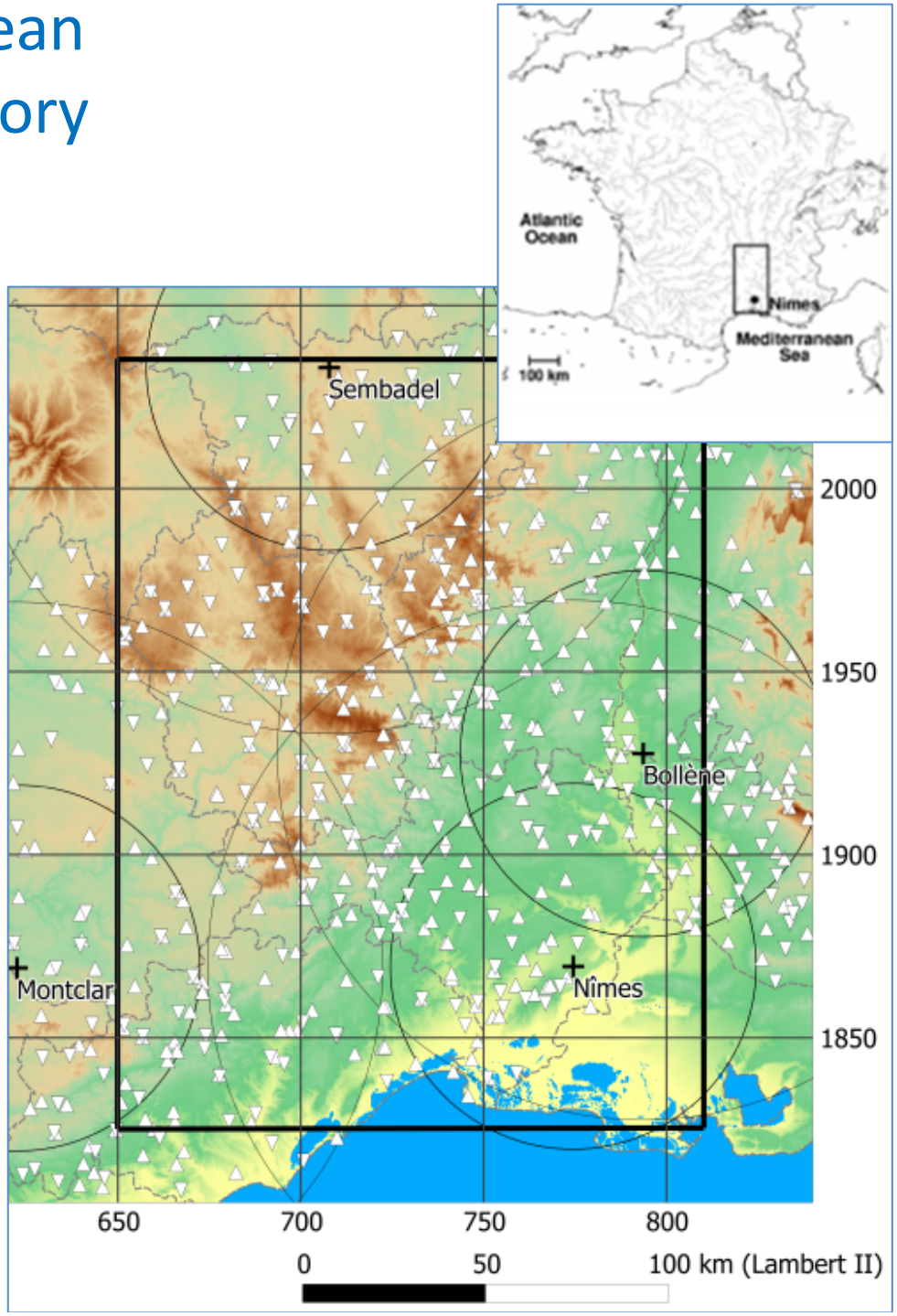
Cévennes-Vivarais Mediterranean Hydrometeorological Observatory

Long-term meteo-hydro-sociological observation for:

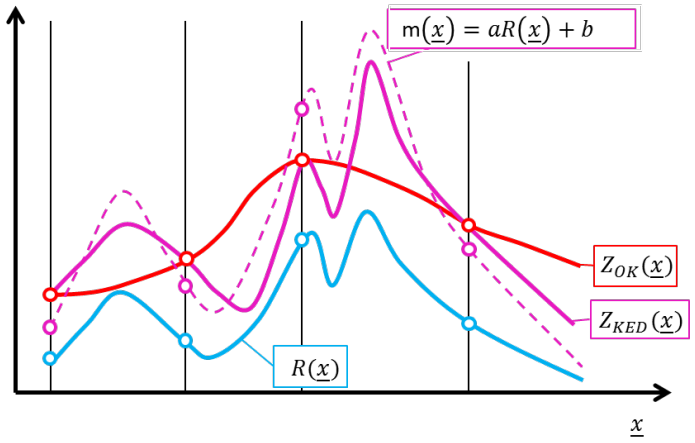
- Understanding physical and sociological processes,
- Improving HPE and flash-flood prediction
- Mitigating societal impacts

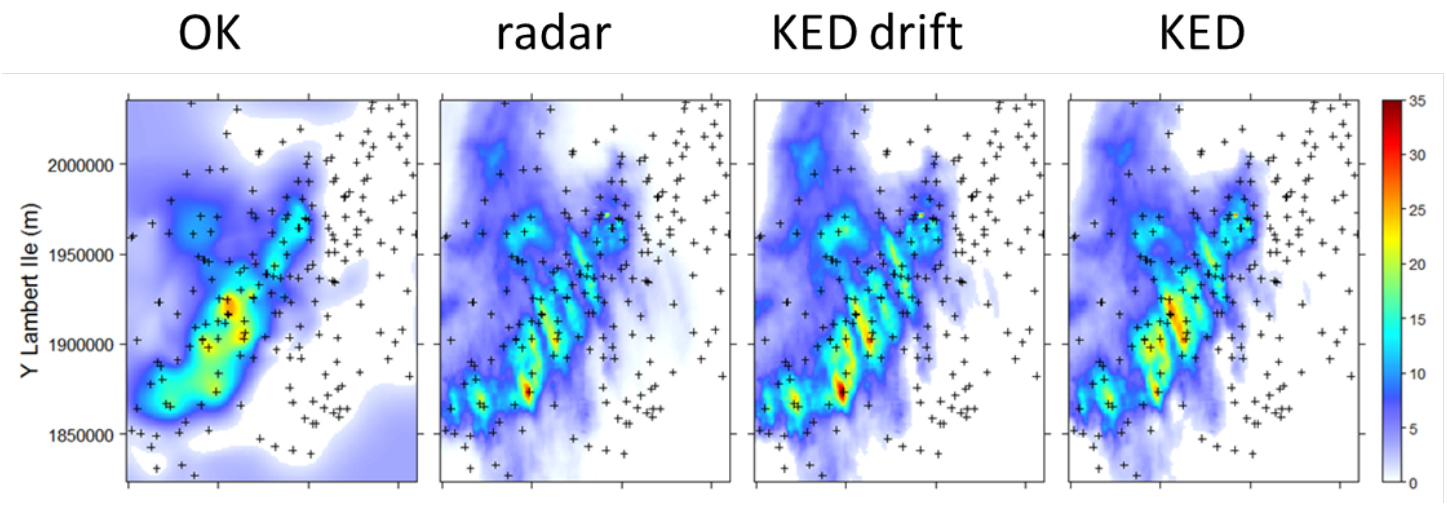
Rainfall observation system (32000 km²)

- 4 MF weather radars (2C and 2S-band)
- 200 hourly raingauges
- 160 daily raingauges
- ~20 disdrometers



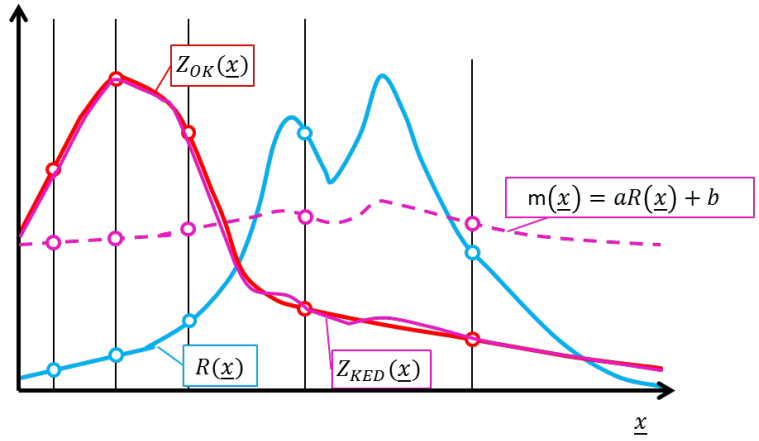
Radar-raingauge merging: Kriging with external drift

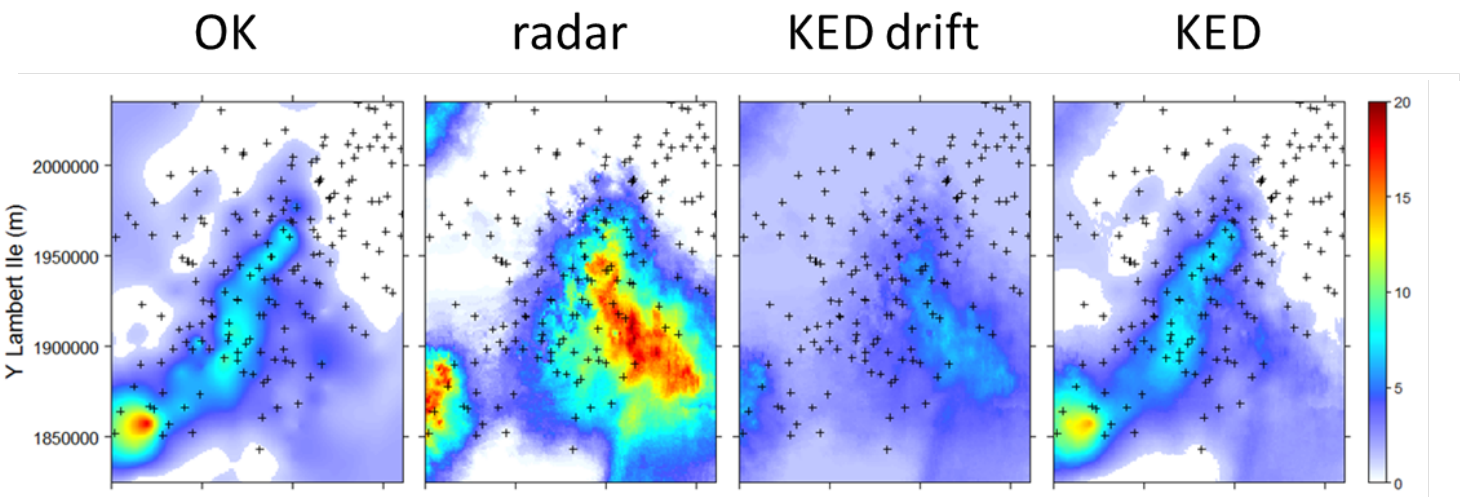




(a)
1400-1500 UTC
03 November 2011

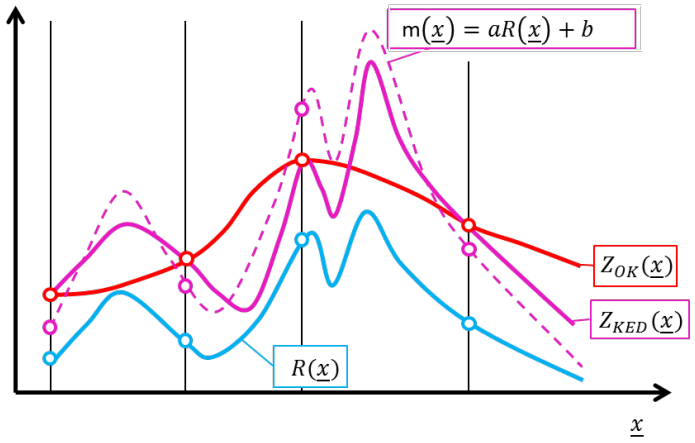
Radar-raingauge merging: Kriging with external drift

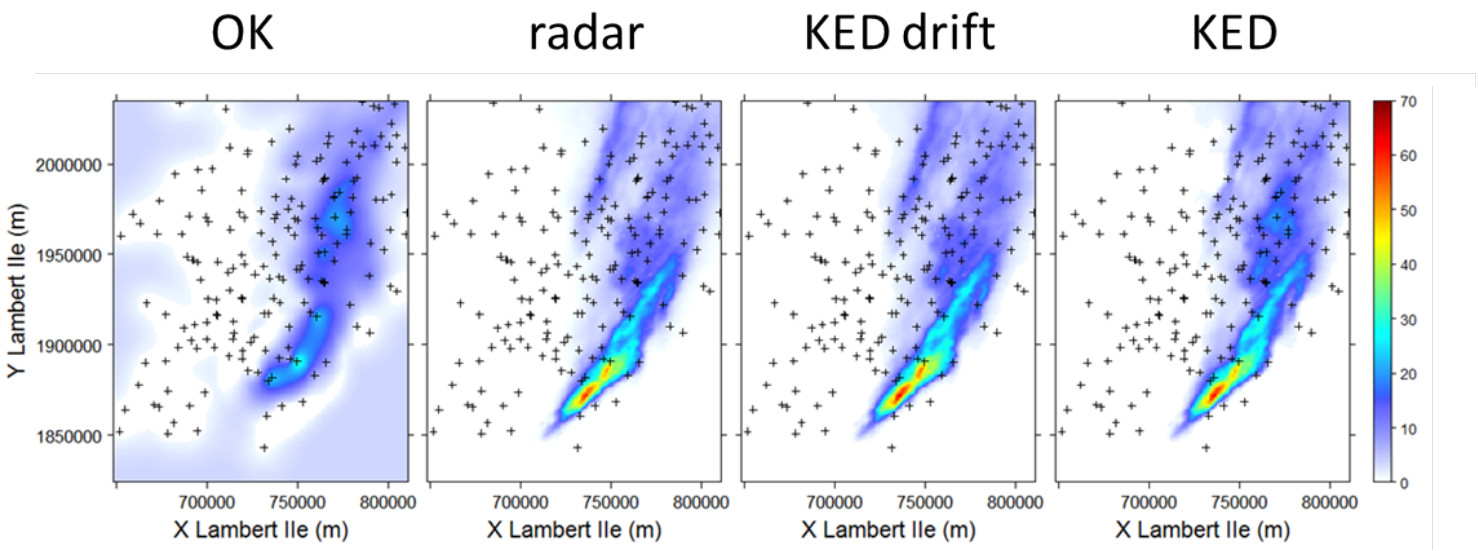




(b)
2100-2200 UTC
03 January 2008

Radar-raingauge merging: Kriging with external drift

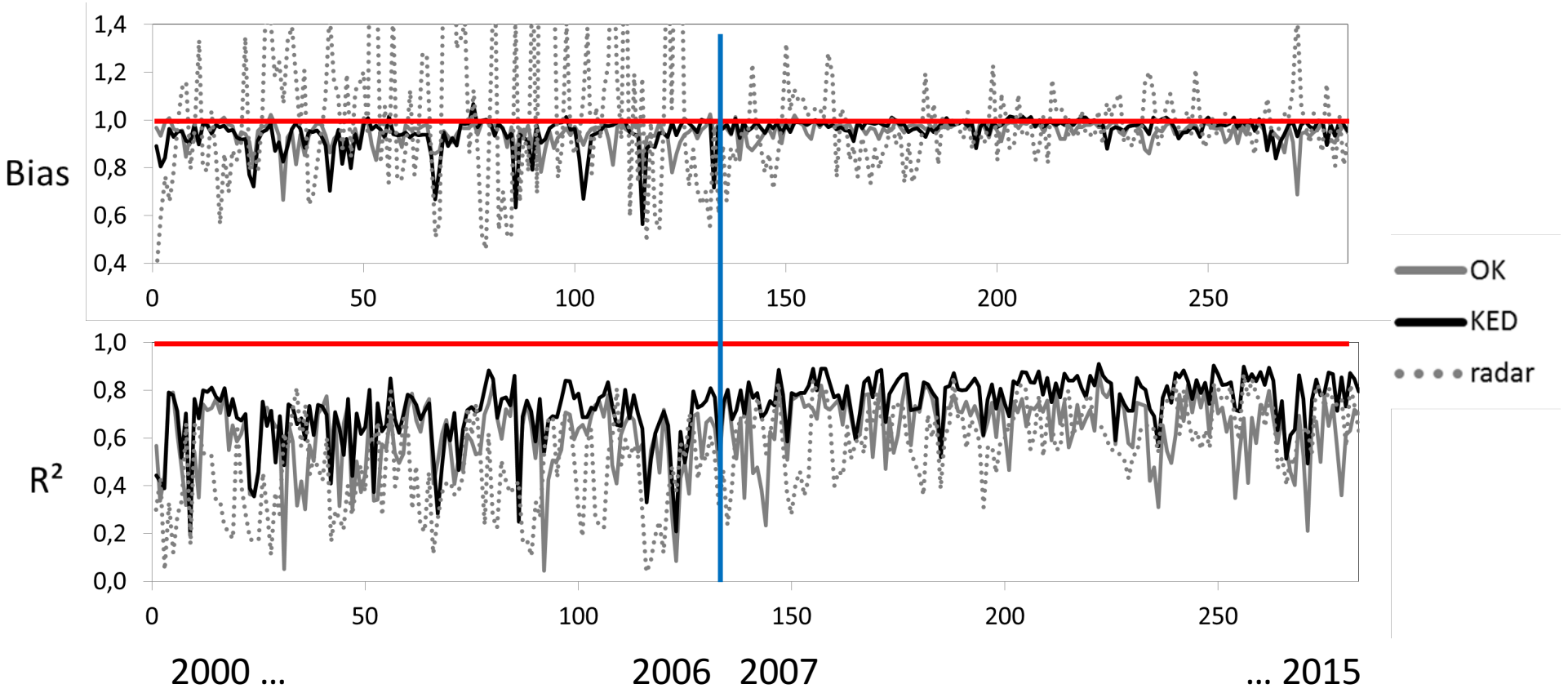




(c)
2200-2300 UTC
08 June 2009

KED vs OK and radar separately: cross-validation

1 hour time step, 283 rain events

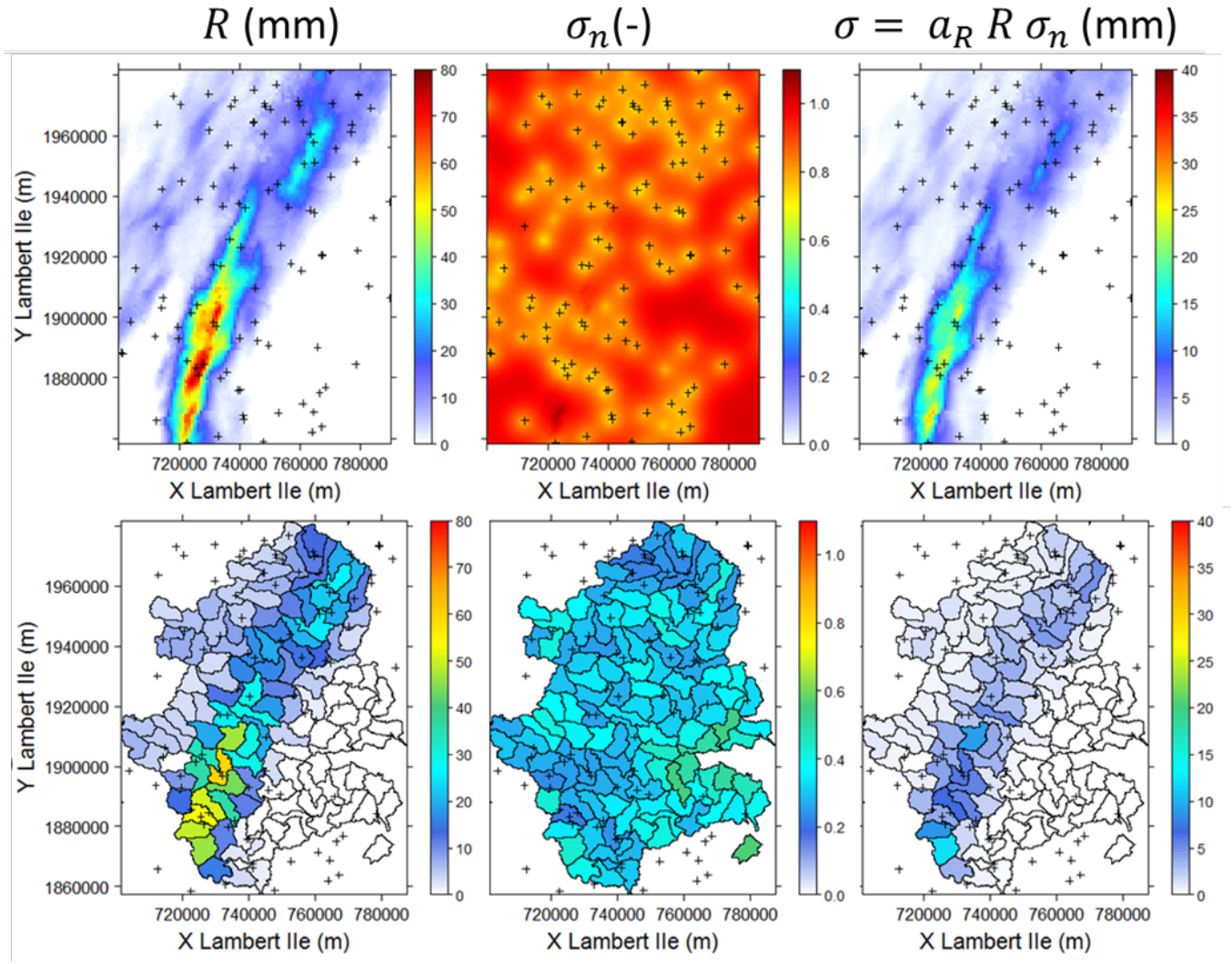


breakpoint:
improved MF radar algorithm implemented in 2007

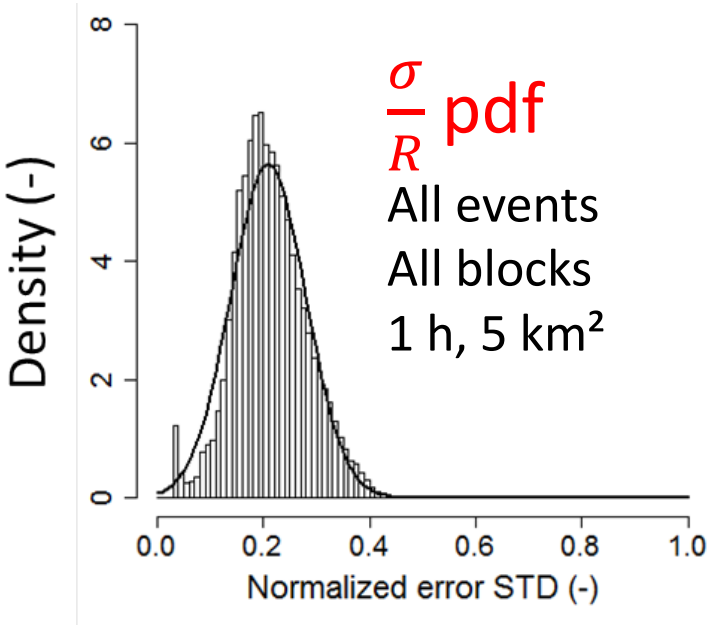
Error model

1 km²

50 km²



Error model



$\frac{\sigma}{R}$ pdf

All events

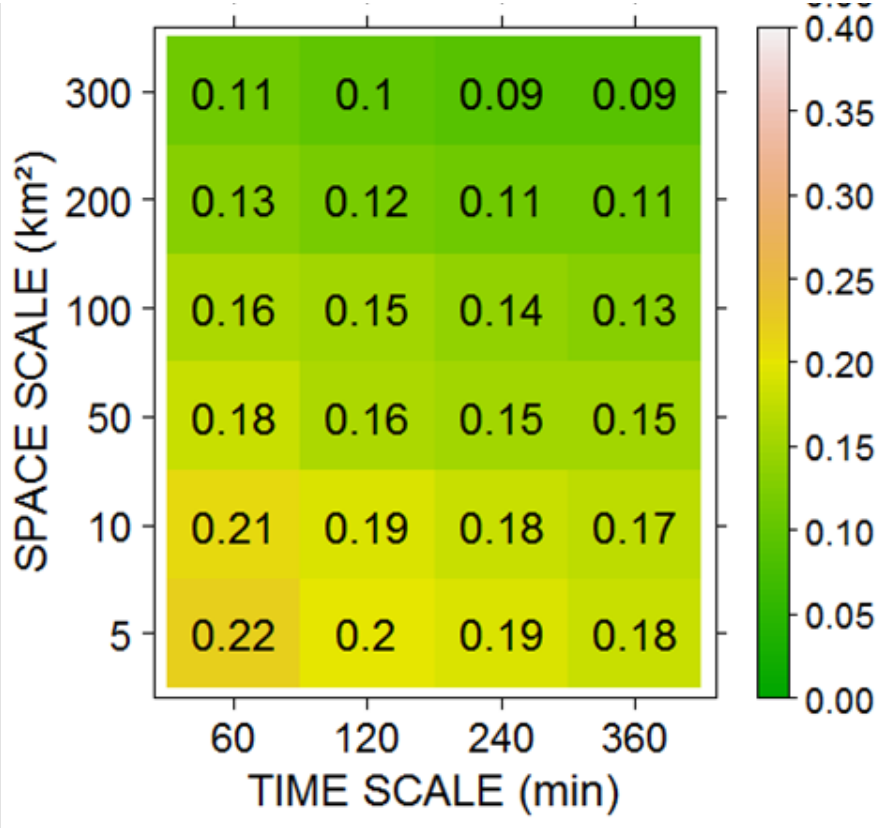
All blocks

1 h, 5 km²

Mean value of $\frac{\sigma}{R}$

All events

All blocks



1-b IMERG4 assessment in the OHM-CV

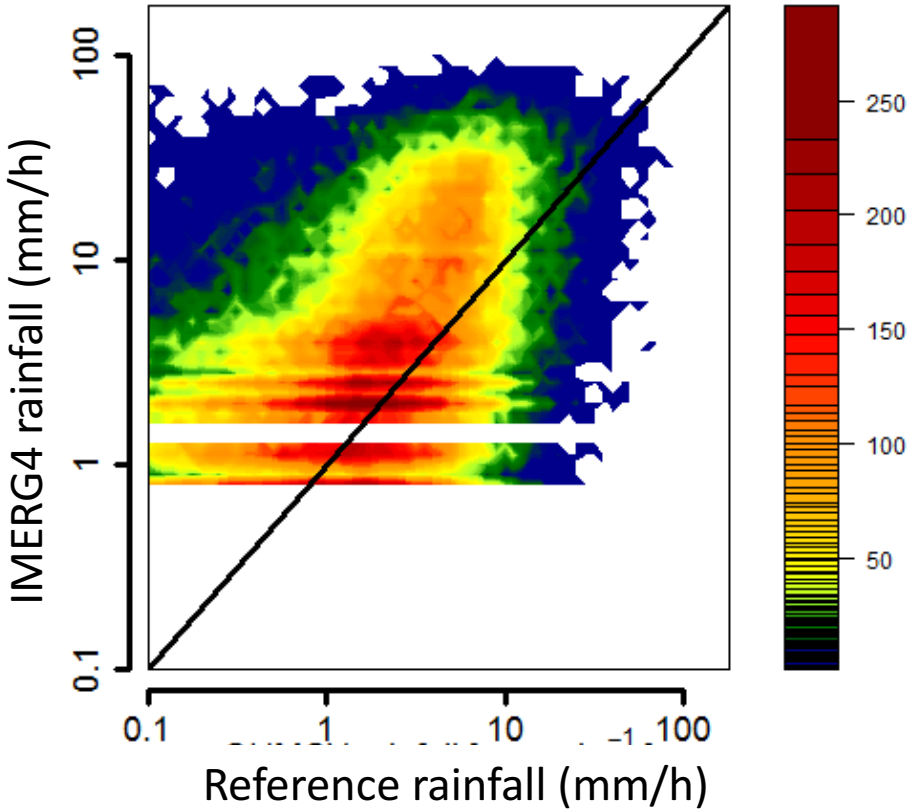
Processing

- 37 rain events between may 2014 and december 2015
- OHM-CV reanalyses:
  - ✓ Grids with 1 km² - 1 h space-time resolution
  - ✓ Coordinates conversion of the 1-km² grids (Lambert 2e -> LatLon)
  - ✓ Agregation over the IMERG 0.1°x0.1° meshes
- IMERG4 products
  - ✓ Time aggregation (30 min -> 1h)
  - ✓ Uncalibrated rainfall estimates
- Statistics

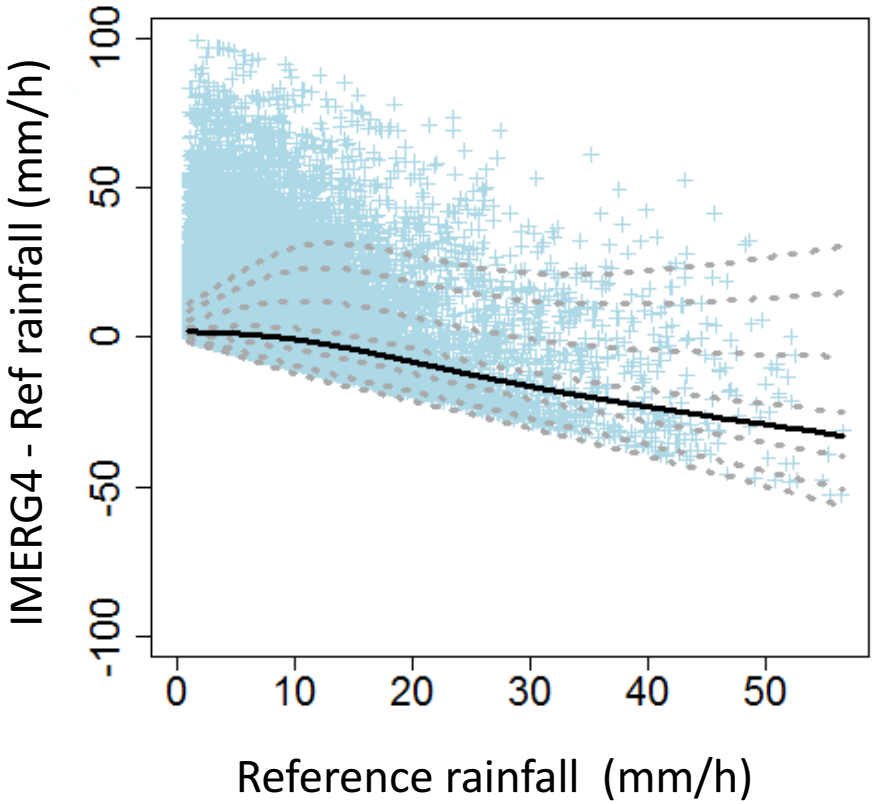
Global results

- All events together
- 1 h time step
- 0.1° x 0.1°
- Threshold: 0.1 mm for both ref and est values

Log-log contingency table

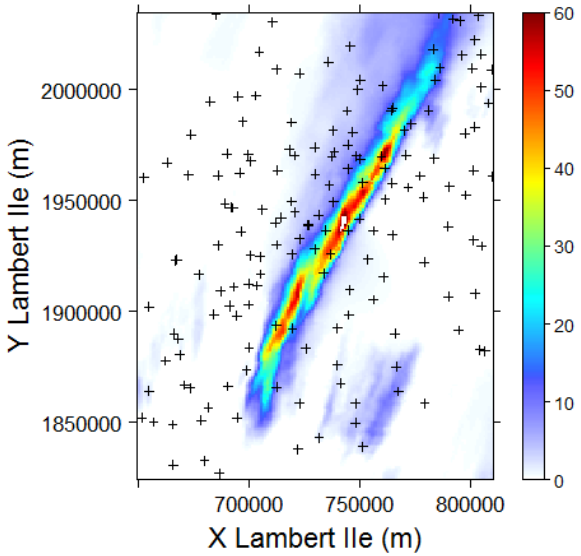


GAMLSS analysis of residuals (est – ref) as a function of ref
pdf used: reverse Gumbel

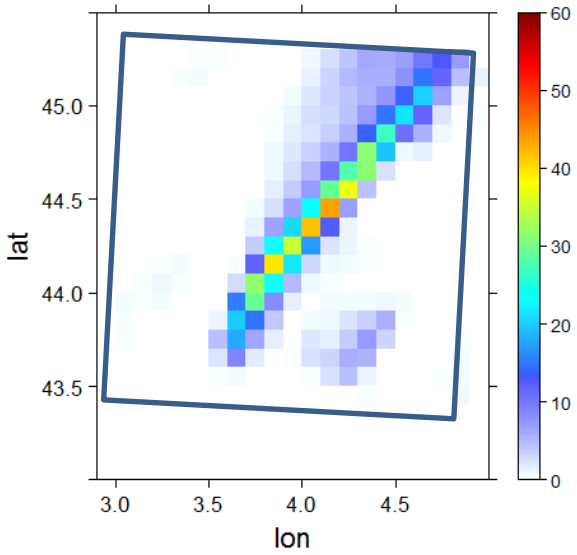


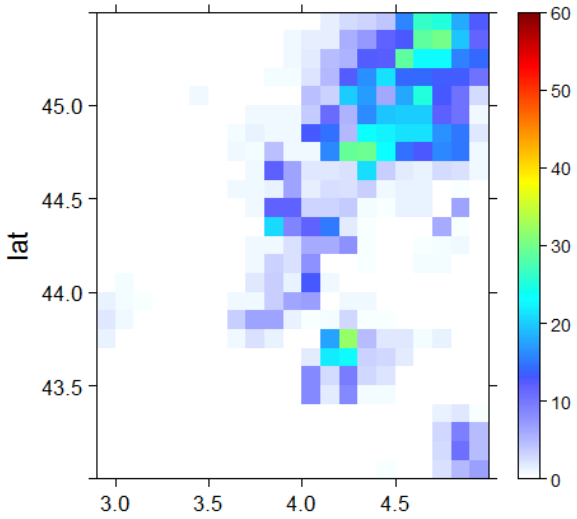
Example 1

OHMCV on native grid

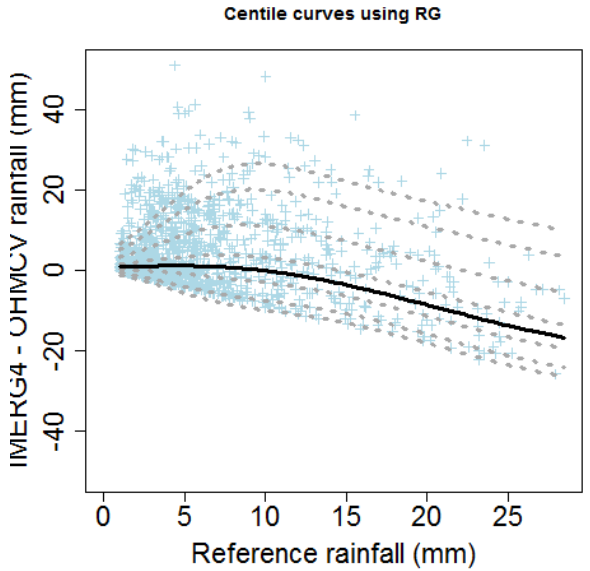


OHMCV on IMERG grid



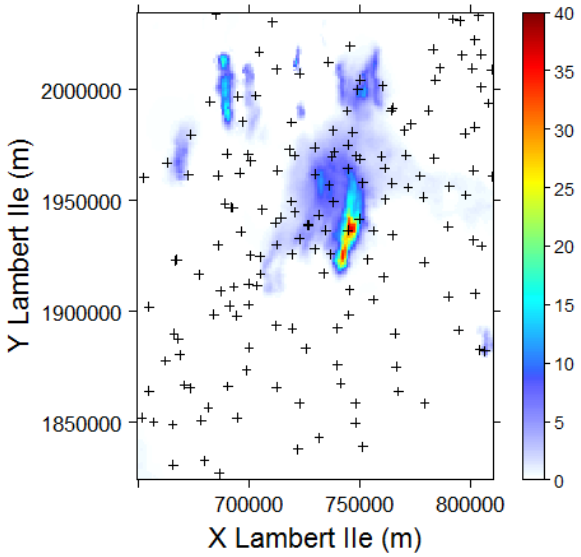


IMERG4

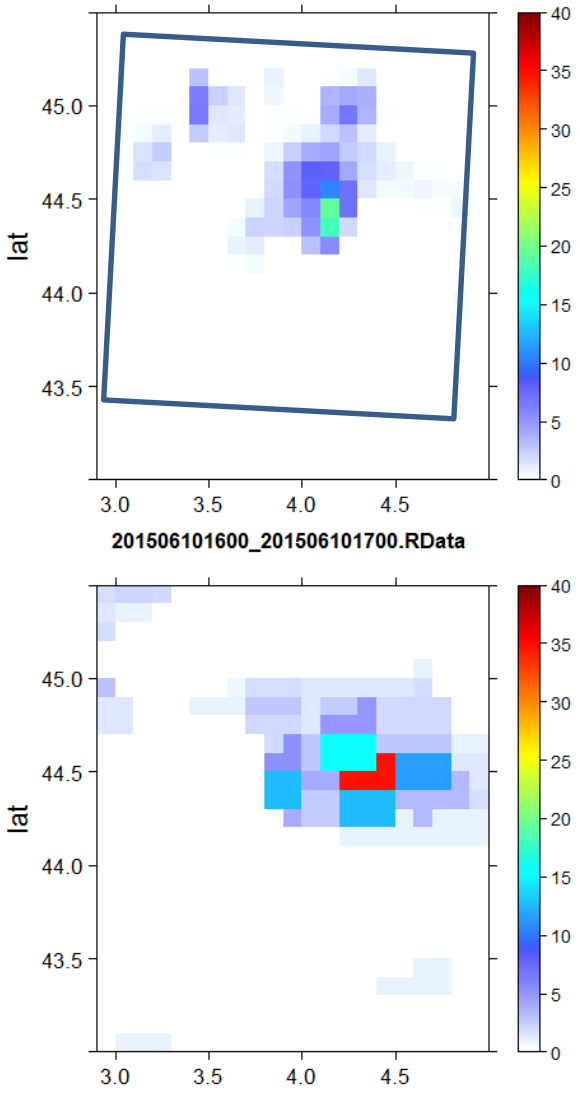


Example 2

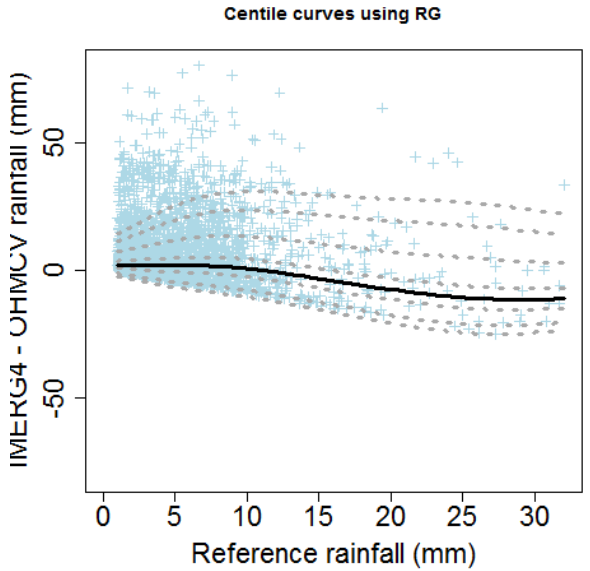
OHMCV on native grid



OHMCV on IMERG grid

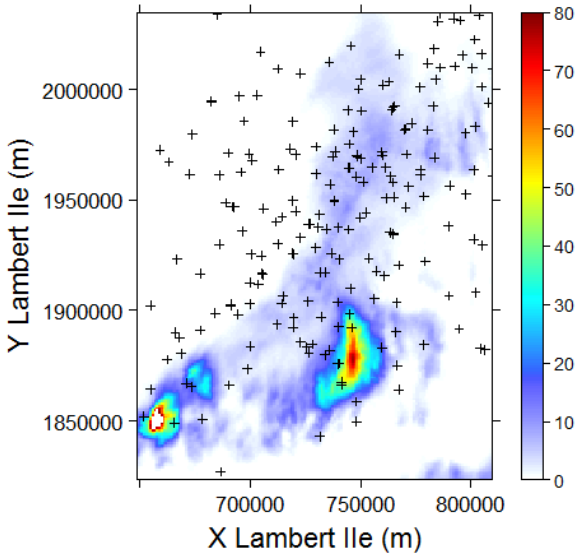


IMERG4

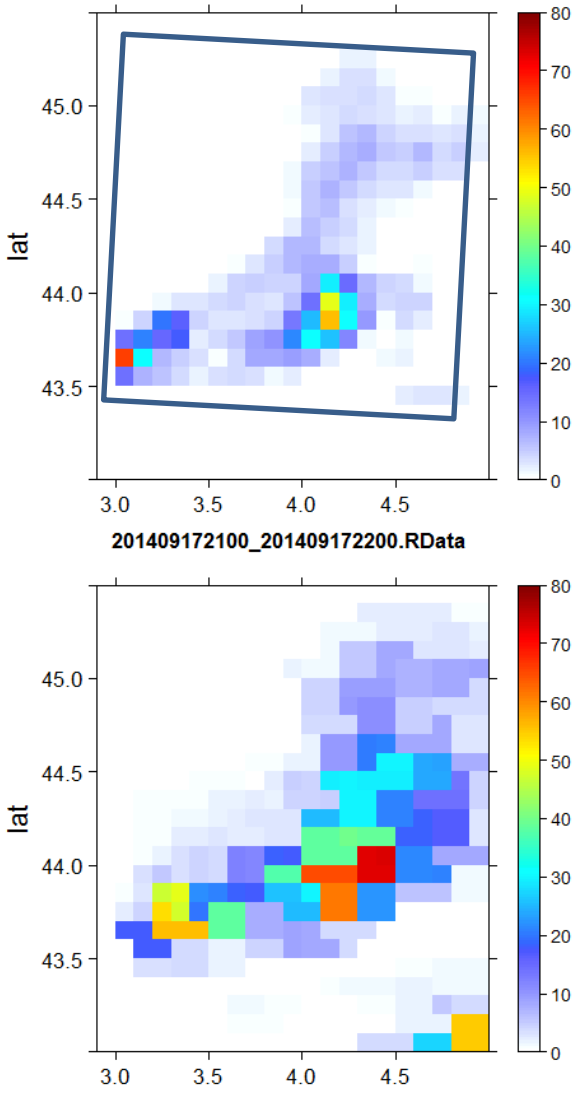


Example 3

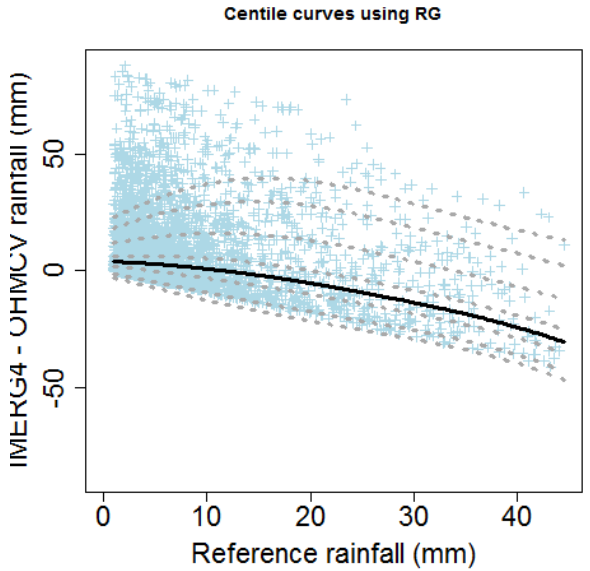
OHMCV on native grid



OHMCV on IMERG grid

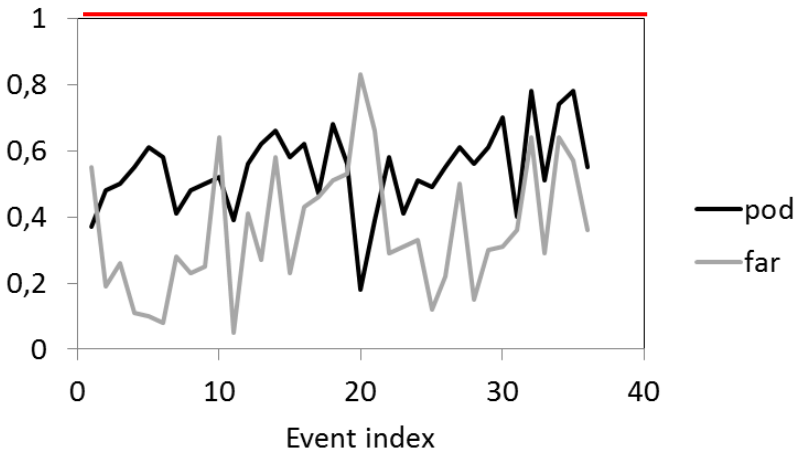


IMERG4

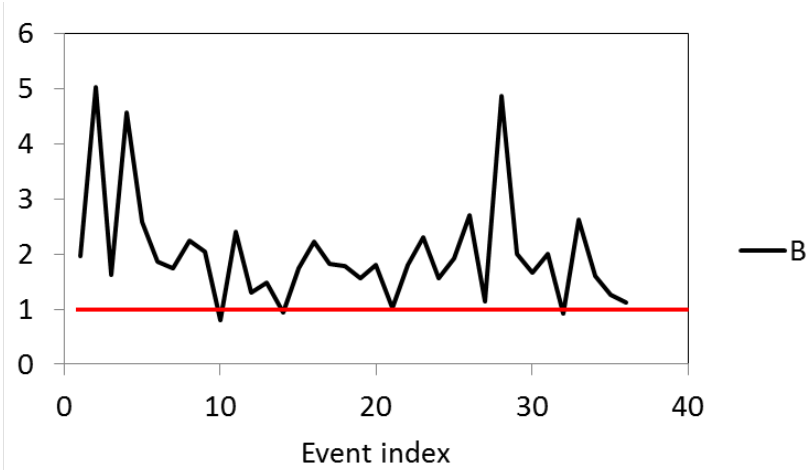


Statistics per event

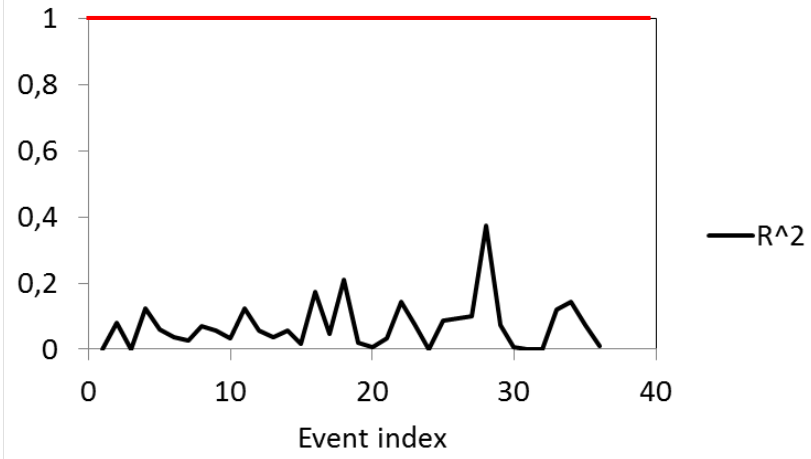
POD and FAR / 1 mm threshold



BIAS (for hits)



R^2 statistics (for hits)



Conclusions

An error structure of IMERG4 products mostly marked by the facts IMERG4 max values are too high and rather poorly colocated with reference max values

In-depth analysis by

- separating IR and MWI/DPR time steps
- considering explanatory factors (freezing level, intermittency, convection / stratiform rain …

Wait for IMERG5

Assessment of DPR products / need for merging radar-raingauge data for time steps less than 1 hour -> a challenge!